

The Potential Pitfalls of Electric Cars, in 5 Charts

If we're going to put the brakes on climate change, electric cars will be crucial. At least, that's the general consensus: Get the heck out of that Hummer, and into something without an exhaust pipe. At least seven countries plan to ban the sale of cars with internal combustion engines sometime in the next few decades, and the specter of losing out on markets like the UK, France, and most of all China (the world's biggest car buyer) has pushed the auto industry to mobilize.

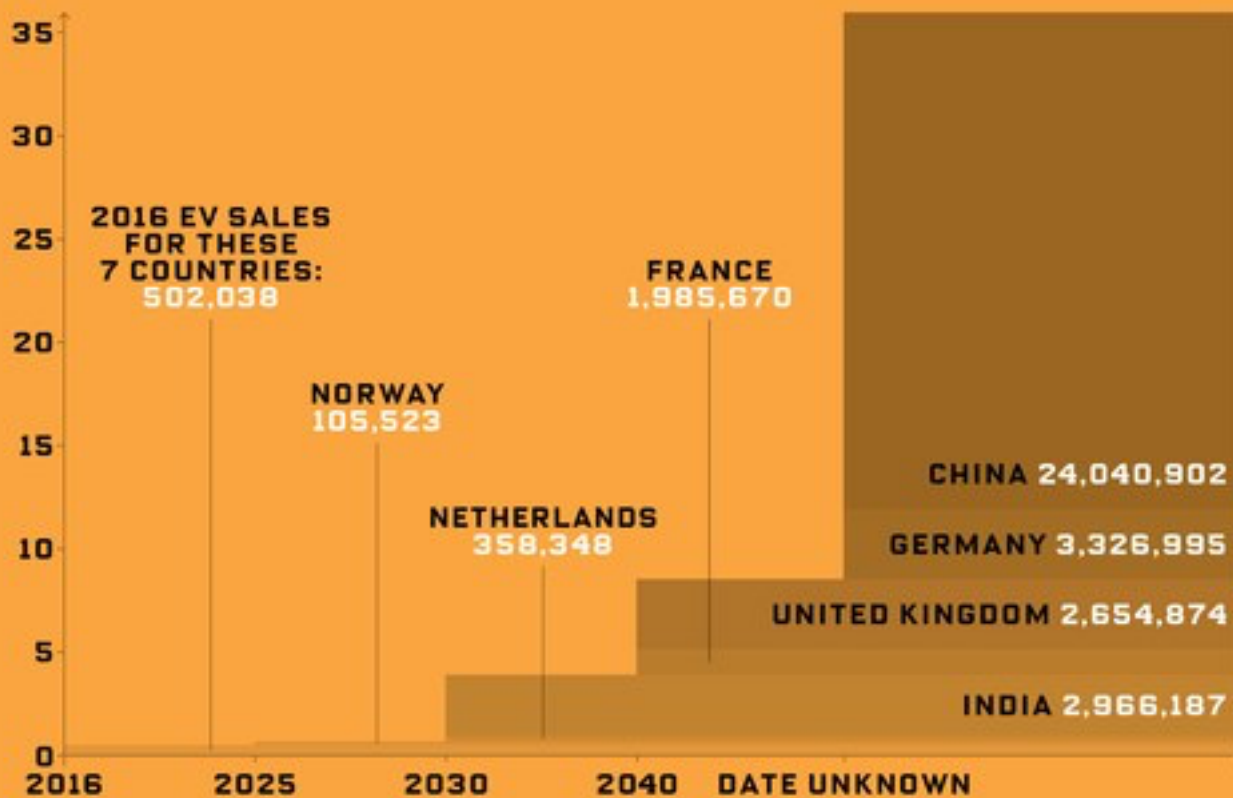
This week, [Ford announced plans to introduce 24 electric or hybrid cars by 2022](#) (it also shared vague plans for a model called the Mach 1, which might be some sort of high performance SUV, to make that transition from your gas guzzler a little easier.) GM is [already all-in on an electric future](#), along with Jaguar Land Rover, Volvo, and Aston Martin.

But you'll find more potholes than panaceas on the road to cleaner, greener, future. So, as we charge our batteries for a new way of driving, here are the questions we should be asking.

1. How many gas cars can we take off the road?

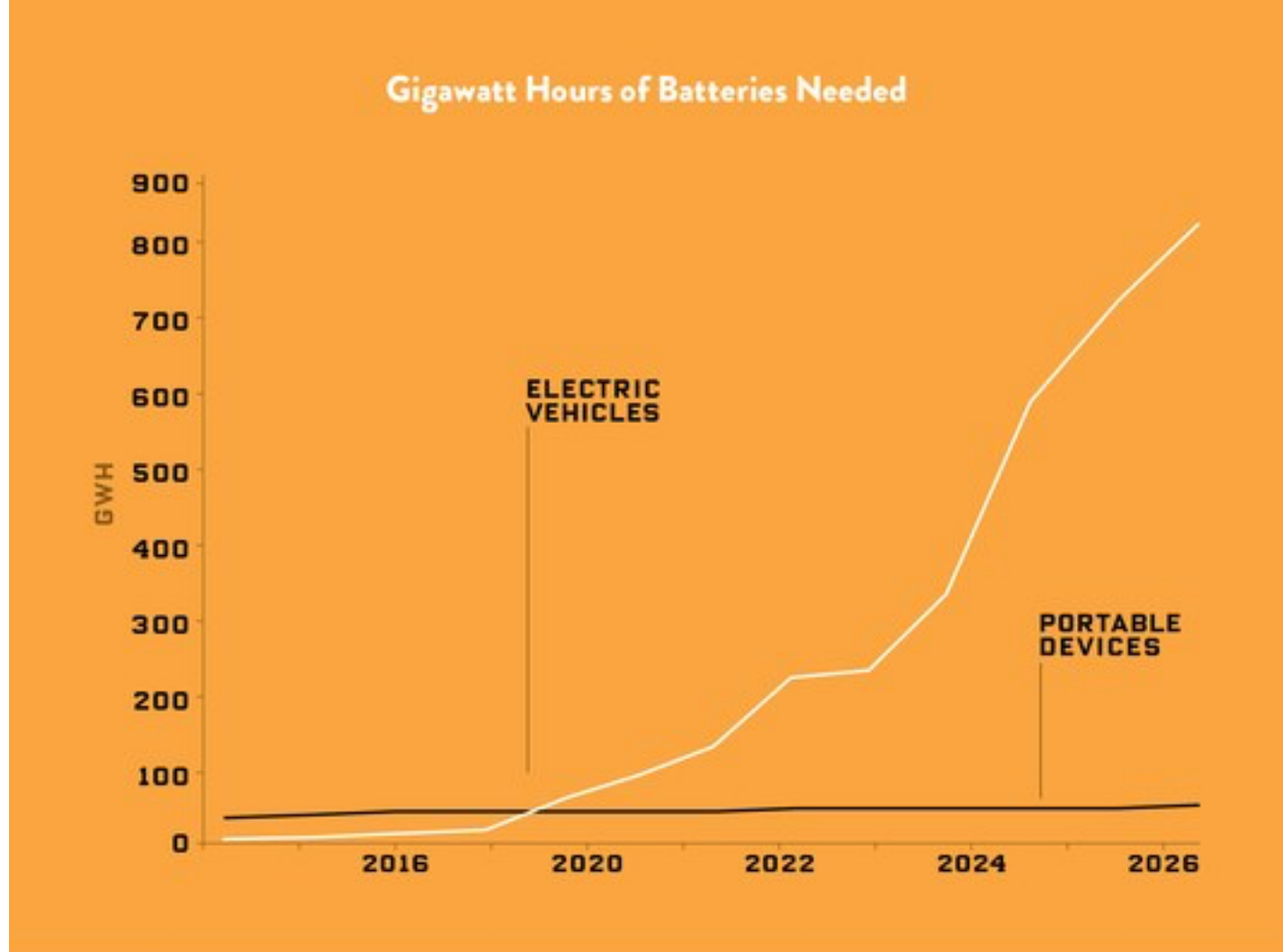
The countries that want bans on gas burners are huge potential markets for EV sales. If demand for personal cars stays constant, we can use current sales figures to estimate how many electric cars we will need.

Projected Cumulative Sales of EVs as More Countries Enact Bans



2. Bring on the batteries.

Toyota and Honda are [still trying to make hydrogen fuel cells happen](#), so far without much customer interest. So all those new EVs will rely on our current best technology, lithium-ion batteries. Fully electric models will need big ones, hybrids can get by with smaller packs, using gas engines as a backup. Tesla is projecting it'll produce 35 gigawatt-hours' worth annually, and [is building the world's biggest building](#), the Gigafactory, in Nevada to do it. But we're going to need way more than that. Cars will soon enough replace consumer electronics as the chief consumers of batteries, and they're going to need a lot more than the things built into your smartphone.



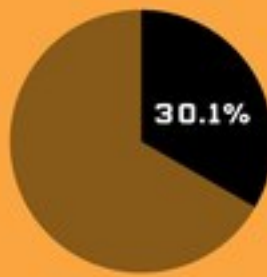
3. What kind of power is charging those cars?

All those batteries are going to need juice, and electric vehicles won't do much to combat climate change if that power comes from dirty sources like coal, oil, or (to a lesser extent) natural gas. It gets a little weird here: The benefits of an electric car will also depend on where it's charged, because all comes down to the local energy production mix.

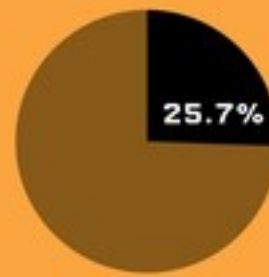
Sources of Electricity Generated in 2016



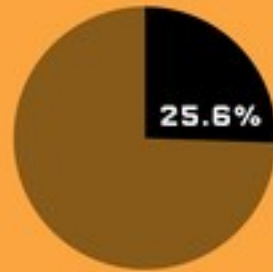
Norway



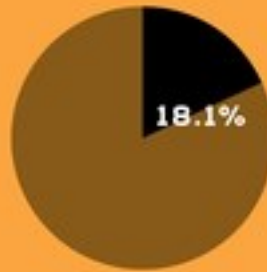
Germany



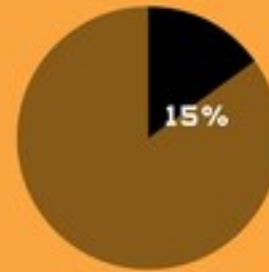
China



United Kingdom



France



India

■ RENEWABLE RESOURCES ■ OTHER (INCLUDES NUCLEAR)

Variations in local energy production mean that sometimes EVs are dirtier than regular cars. If you live in a state that generates electricity from coal (hey, Kansans) your electric car probably won't be much kinder to the environment than a gas gulper that gets more than 35 miles per gallon of gasoline. In India, your electric car is about as clean as a conventional vehicle that gets 20 mpg, because power generation is still dominated by fossil fuels.

Fuel Efficiency a Gas Car Would Need to Match the Impact of an Electric Car



4. What are the batteries made of?

Even if we switch the entire global energy supply to renewables, we're going to have to mine a lot more cobalt, lithium, and other raw ingredients to create all those batteries—and do so sustainably and responsibly. For example, more than 60 percent of the world's cobalt—a key ingredient for lithium-ion battery electrodes—comes from the Democratic Republic of Congo, where [human rights abuses are rampant](#).

Researchers are working on new batteries that require fewer problematic ingredients, and the countries proposing the bans will ideally follow through with commitments to renewable energy. After all, if we don't make the system clean from top to bottom, global warming wins.